

**MODULE IV**  
**GEOLOGIC REPOSITORY DISPOSAL**

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**IV. MODULE IV - GEOLOGIC REPOSITORY DISPOSAL**

**IV.A. DESIGNATED DISPOSAL UNITS**

This Module authorizes the management and disposal of ~~contact-handled (CH)~~ transuranic (TRU) mixed waste containers in the Underground Hazardous Waste Disposal Units (**Underground HWDUs**) identified herein. Specific facility and process information for the management and disposal of ~~CH~~ TRU mixed waste in the Underground HWDUs is incorporated in Permit Attachment M2 (Geologic Repository).

**IV.A.1. Underground Hazardous Waste Disposal Units**

The Underground HWDUs are located at the WIPP facility approximately 2150 feet (665 meters) below the ground surface within the Salado formation. An Underground HWDU is a single excavated panel, consisting of seven rooms and two access drifts, designated for disposal of TRU mixed waste containers.

The Permittees may dispose TRU mixed waste in the Underground HWDUs, provided the Permittees comply with the following conditions:

IV.A.1.a. Disposal containers - the Permittees shall dispose TRU mixed waste in containers specified in Permit Condition IV.C.1.

IV.A.1.b. Disposal locations and quantities - the Permittees shall dispose TRU mixed waste containers in three (3) Underground HWDUs, as specified in Table IV.A.1 below and depicted in Permit Attachment M2, Figure M2-1. The Permittees may dispose quantities of TRU mixed waste containers in these locations not to exceed the maximum capacities specified in Table IV.A.1 below.

Table IV.A.1 - Underground HWDUs			
Description	Area	Maximum Capacity	Container Equivalent
Panel 1	124,150 ft <sup>2</sup> (11,533 m <sup>2</sup> )	636,000 ft <sup>3</sup> (18,000 m <sup>3</sup> )	86,500 55-Gallon Drums
Panel 2	124,150 ft <sup>2</sup> (11,533 m <sup>2</sup> )	636,000 ft <sup>3</sup> (18,000 m <sup>3</sup> )	86,500 55-Gallon Drums
Panel 3	124,150 ft <sup>2</sup> (11,533 m <sup>2</sup> )	<del>636,000</del> <u>660,000</u> ft <sup>3</sup> ( <del>18,000</del> <u>18,700</u> m <sup>3</sup> )	86,500 55-Gallon Drums <u>and 750 RH TRU Canisters</u>
<u>Future Panels as approved</u>	<u>124,150 ft<sup>2</sup> (11,533 m<sup>2</sup>)</u>	<u>660,000 ft<sup>3</sup> (18,700 m<sup>3</sup>)</u>	<u>86,500 55-Gallon Drums and 750 RH TRU Canisters</u>
<b>Total (for panels 1, 2, and 3)</b>	--	<del>1,908,000</del> <u>1,980,000</u> ft <sup>3</sup> ( <del>54,000</del> <u>54,700</u> m <sup>3</sup> )	<b>259,500 55-Gallon Drums <u>and 750 RH TRU Canisters</u></b>

#### IV.B. PERMITTED AND PROHIBITED WASTE IDENTIFICATION

##### IV.B.1. Permitted Waste

The Permittees may dispose TRU mixed waste in the Underground HWDUs, provided the Permittees comply with the following conditions:

IV.B.1.a. Waste analysis plan - the TRU mixed waste shall be characterized analyzed to comply with the waste analysis plan specified in Permit Condition II.C.1.

IV.B.1.b. TSDF Waste acceptance criteria - the TRU mixed waste shall comply with the treatment, storage, and disposal facility (**TSDF**) waste acceptance criteria specified in Permit Condition II.C.3.

IV.B.1.c. Hazardous waste codes numbers - the TRU mixed waste shall contain only hazardous waste codes numbers specified in Permit Condition II.C.3.

Derived waste may be disposed in the Underground HWDUs as specified in Permit Condition II.C.5.

IV.B.2. Prohibited Waste

IV.B.2.a                      General prohibition - the Permittees shall not dispose any TRU mixed waste that fails to comply with Permit Condition IV.B.1.

IV.B.2.b                      Specific prohibition - after this Permit becomes effective, the Permittees shall not dispose non-mixed TRU waste in any Underground HWDU unless such waste is characterized analyzed in accordance with the requirements of the WAP specified in Permit Condition II.C.1. The Permittees shall not dispose TRU mixed waste in any Underground HWDU if the Underground HWDU contains non-mixed TRU waste which was disposed of after this Permit became effective and was not characterized analyzed in accordance with the requirements of the WAP.

IV.C.                      DISPOSAL CONTAINERS

IV.C.1. Acceptable Disposal Containers

The Permittees shall use containers that comply with the requirements for U.S. Department of Transportation shipping container regulations (49 CFR §173 - Shippers - General Requirements for Shipment and Packaging, and 49 CFR §178 - Specifications for Packaging) for disposal of TRU mixed waste at WIPP. The Permittees are prohibited from disposing TRU mixed waste in any container not specified in Permit Attachment M1, Section M1-1b, as set forth below:

IV.C.1.a.                      Standard 55-gallon (208-liter) drum - configured as a 7-pack or as an individual unit.

IV.C.1.b.                      Standard waste box (SWB) - as an individual unit.

IV.C.1.c.                      Ten-drum overpack (TDOP) - as an individual unit.

IV.C.1.d.                      85-gallon (322-liter) drum - configured as a 4-pack or as an individual unit.

IV.C.1.e.                      100 gallon (379-liter) drum - configured as a 3-pack or as an individual unit.

IV.C.1.f.

RH canister or RH facility canister - each canister as an individual unit.

IV.C.2. Condition of Containers

If a container holding TRU mixed waste is not in good condition (e.g., severe rusting, apparent structural defects) or if it begins to leak prior to disposal in an Underground HWDU, the Permittees shall manage the TRU mixed waste containers specified in Permit Condition IV.C.1 as specified in Permit Attachment M1 and in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.171).

IV.D. VOLATILE ORGANIC COMPOUND LIMITS

The Permittees shall limit releases to the air of volatile organic compound waste constituents (VOCs) as specified by the following conditions, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601(c)):

IV.D.1. Room-Based Limits

The ~~average~~ measured concentration of VOCs in the headspace gas of all containers and the ~~average calculated emission rate of VOCs from the headspace gas of all containers in any single~~ open (active) rooms and all closed rooms in active panels within an Underground HWDU shall not exceed the limits specified in Table IV.D.1 below:

Table IV.D.1 - VOC Room-Based Limits		
Compound	VOC Room-Based Concentration Limit (PPMV)	VOC Room-Based Emission Rate Limit (mole/room/year)
Carbon Tetrachloride	9625	4250
Chlorobenzene	13000	5500
Chloroform	9930	4860
1,1-Dichloroethene	5490	2800
1,2-Dichloroethane	2400	1160
Methylene Chloride	100000	53650
1,1,2,2-Tetrachloroethane	2960	1300
Toluene	11000	4780
1,1,1-Trichloroethane	33700	14880

There are no maximum concentration or emission rate limits for other VOCs.

IV.D.2. Determination of VOC Room-Based Limits

The Permittees shall **confirm** the VOC concentration and emission rate limits identified in Permit Condition IV.D.1 using the following procedures VOC Monitoring Plan. The Permittees shall conduct monitoring of VOCs as specified in Permit Condition IV.F.2 and as described in Permit Attachment N.

IV.D.2.a. ~~VOC Confirmatory Monitoring - the Permittees shall conduct confirmatory monitoring of VOCs as specified in Permit Condition IV.F.2.~~

IV.D.2.c. ~~WIPP Waste Information System (WWIS) Report - the Secretary shall have the capability of generating a report from the WWIS database, or equivalent, for identifying the average concentrations and total emission rates of the VOCs specified in Table IV.D.1 on a room and panel basis, based upon the actual waste containers disposed, the VOC headspace gas sampling data for those containers, and the filter diffusion characteristics for those containers.~~

IV.E. DESIGN, CONSTRUCTION, AND OPERATION REQUIREMENTS

The Permittees shall design, construct, and operate the Underground HWDUs as specified by the following conditions and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601):

IV.E.1. Repository Design

The Permittees shall construct each Underground HWDU in conformance with the requirements specified in Permit Attachment M2 and Permit Attachment M3 (Drawing Number 51-W-214-W, "Underground Facilities Typical Disposal Panel").

IV.E.2. Repository Construction

Subject to Permit Condition IV.E.1, the Permittees may excavate the following Underground HWDUs, as depicted in Permit Attachment M2, Figure M2-1, "Repository Horizon", and specified in Section M2-2a(3), "Subsurface Structures (Underground Hazardous Waste Disposal Units (HWDUs))":

- Panel 10 (Disposal area access drift)
- Panel 2
- Panel 9 (Disposal area access drift)
- Panel 3
- Panel 4

Prior to disposal of TRU mixed waste in a newly constructed Underground HWDU, the Permittees shall comply with the certification requirements specified in Permit Condition I.E.11.

#### IV.E.3. Repository Operation

IV.E.3.a. Underground traffic flow - the Permittees shall restrict and separate the ventilation and traffic flow areas in the underground TRU mixed waste handling and disposal areas from the ventilation and traffic flow areas for mining and construction equipment as specified in Permit Attachment G (Traffic Patterns), Figure G-4. TRU mixed waste handling and disposal traffic shall use the waste area intake ventilation drift to access the Underground HWDUs. Mining and construction equipment traffic may use either the construction area intake ventilation drift or the exhaust ventilation drift to access the mining and construction areas.

IV.E.3.b. Ventilation - the Permittees shall maintain a minimum running annual average mine ventilation exhaust rate of 260,000 standard ft<sup>3</sup>/min and a minimum active room ventilation rate of 35,000 standard ft<sup>3</sup>/min when workers are present in the room, as specified in Permit Attachment M2, Section M2-2a(3), "Subsurface Structures (Underground Ventilation System Description)" and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601(c)).

IV.E.3.C. Ventilation barriers - the Permittees shall construct ventilation barricades in active Underground HWDUs to prevent the flow of mine ventilation air through full disposal rooms, as specified in Permit Attachment M2, Section M2-2a(3), "Subsurface Structures (Underground Ventilation System Description)" and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601(c)).

#### IV.F. MAINTENANCE AND MONITORING REQUIREMENTS

The Permittees shall maintain and monitor the Underground HWDUs as specified by the following conditions and as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.601 and 264.602):



IV.F.1. Geomechanical Monitoring

- IV.F.1.a. Implementation of geomechanical monitoring program - the Permittees shall implement a geomechanical monitoring program in each Underground HWDU as specified in Permit Attachment M2, Section M2-5b(2), "Geomechanical Monitoring" and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.602).
- IV.F.1.b. Reporting requirements - the Permittees shall submit to the Secretary an annual report, beginning twelve (12) months after issuance of this Permit, evaluating the geomechanical monitoring program and shall include geomechanical data collected from each Underground HWDU during the previous year, as specified in Permit Attachment M2, Section M2-5b(2), "Geomechanical Monitoring".
- IV.F.1.c. Notification of adverse conditions - when evaluation of the geomechanical monitoring system data identifies a trend towards unstable conditions which requires a decision whether to terminate waste disposal activities in any Underground HWDU, the Permittees shall provide the Secretary with the same report provided to the WIPP Operations Manager within five (5) working days of its issuance, as specified in Permit Attachment M2, Section M2-5b(2)(a), "Description of the Geomechanical Monitoring System".

IV.F.2. Air Monitoring

- IV.F.2.a. Implementation of Confirmatory VOC Monitoring Plan - the Permittees shall implement ~~the Confirmatory VOC Monitoring Plan~~ confirmatory VOC monitoring as specified in Permit Attachment N (~~Confirmatory~~ Volatile Organic Compound Monitoring Plan) and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.602 and §264.601(c)). The Permittees shall implement this plan within thirty (30) calendar days of issuance of this Permit until the certified closure of all Underground HWDUs.
- IV.F.2.b. Reporting requirements for Confirmatory VOC Monitoring - the Permittees shall submit to the Secretary an annual report, beginning twelve (12) months after issuance of this permit, describing the implementation and presenting the data and analysis ~~of the Confirmatory VOC Monitoring Plan~~ for confirmatory VOC monitoring.

This report shall also present data from the WWIS as specified in Permit Condition IV.D.2.b and correlate this data, using appropriate statistical methods, with data from the Confirmatory VOC Monitoring Plan.

IV.F.2.c. Notification requirements for Confirmatory VOC Monitoring - the Permittees shall notify the Secretary in writing, within five (5) working days of obtaining validated analytical results, whenever the concentration of any VOC specified in Table IV.D.1 exceeds the concentration of concern specified in Table IV.F.2.c below.

The Permittees shall notify the Secretary in writing, within five (5) working days of obtaining validated analytical results, whenever the running annual average concentration (calculated after each sampling event) for any VOC specified in Table IV.D.1 exceeds the concentration of concern specified in Table IV.F.2 below.

Table IV.F.2.c - VOC Concentrations of Concern		
Compound	Drift E-300 Concentration	
	ug/m3	ppbv
Carbon Tetrachloride	1050	165
Chlorobenzene	1015	220
Chloroform	890	180
1,1-Dichloroethene	410	100
1,2-Dichloroethane	175	45
Methylene Chloride	6700	1930
1,1,2,2-Tetrachloroethane	350	50
Toluene	715	190
1,1,1-Trichloroethane	3200	590

IV.F.2.d. Remedial action for Confirmatory VOC Monitoring - if the running annual average concentration for a VOC specified in Table IV.D.1 exceeds the concentration of concern specified in Table IV.F.2.c, the Permittees shall cease disposal in the active disposal room and install ventilation barriers as specified in Permit Condition IV.E.3.c.

If the running annual average concentration for a VOC specified in Table IV.D.1 exceeds the concentration of concern specified in Table IV.F.2.c for six (6) consecutive months, the Permittees shall close the affected Underground HWDU as specified in Permit Condition IV.1.1.

For any remedial action taken under this Permit Condition, the Permittees shall submit to the Secretary written quarterly status reports, beginning thirty (30) calendar days after the Permittees submit the initial notification in Permit Condition IV.F.2.c which resulted in the remedial action. The quarterly status report shall analyze the cause of exceedance, describe the implementation and results of the remedial action, and describe measures taken to prevent future exceedances. The Permittees shall submit such reports until the Secretary determines the remedial action has been completed in accordance with all applicable requirements of this Permit.

IV.F.2.e.      Implementation of Disposal Room VOC Monitoring - The Permittees shall implement disposal room VOC monitoring specified in Permit Attachment N.

IV.F.2.f.      Reporting Requirements for Disposal Room Monitoring - The Permittees shall notify the Secretary in writing, within five (5) working days of obtaining validated analytical results, whenever the concentration of any VOC specified in Table IV.D.1 in any closed room in an active panel or in any immediately adjacent closed room exceeds the action levels specified in Table IV.F.2.g.

<u>Table IV.F.2.g</u> <u>Action Levels For Disposal Room Monitoring</u>		
<u>Compound</u>	<u>50% Action Levels for VOC Constituents of Concern in Any Closed Room, ppmv</u>	<u>95% Action Levels for VOC Constituents of Concern in Immediately Adjacent Closed Room, ppmv</u>
<u>Carbon Tetrachloride</u>	<u>4,813</u>	<u>9,145</u>
<u>Chlorobenzene</u>	<u>6,500</u>	<u>12,350</u>
<u>Chloroform</u>	<u>4,965</u>	<u>9,433</u>
<u>1,1-Dichloroethene</u>	<u>2,745</u>	<u>5,215</u>

<u>1,2,-Dichloroethane</u>	<u>1,200</u>	<u>2,280</u>
<u>Methylene Chloride</u>	<u>50,000</u>	<u>95,000</u>
<u>1,1,2,2-Tetrachloroethane</u>	<u>1,480</u>	<u>2,812</u>
<u>Toluene</u>	<u>5,500</u>	<u>10,450</u>
<u>1,1,1-Trichloroethane</u>	<u>16,850</u>	<u>32,015</u>

IV.F.2.g.      Remedial Action for Disposal Room Monitoring - upon receiving validated analytical results that indicate one or more of the VOCs specified in Table IV.D.1 in any of the closed rooms in an active panel has reached a concentration of one half of the limit in Table IV.D.1, the sampling frequency for such closed rooms will increase to once per week. The once per week sampling will continue either until the concentrations in the closed rooms fall below one half of the limits in Table IV.D.1, or until closure of Room 1 of the panel, whichever occurs first. If one or more of the VOCs in Table IV.D.1 reaches a concentration of 95 percent in the closed room immediately adjacent to the active room, another sample will be taken to confirm the existence of such a condition. If the second sample confirms that the immediately adjacent closed room is at the 95 percent action level in Table IV.F.2.g, the active open room will be abandoned, ventilation barriers will be installed as specified in Permit Condition IV.E.3.c, waste emplacement will proceed in the next open room, and monitoring of the subject closed room will continue at a frequency of once per week until commencement of panel closure.

IV.F.3. Mine Ventilation Rate Monitoring

IV.F.3.a.      Implementation of Mine Ventilation Rate Monitoring Plan - the Permittees shall implement the Mine Ventilation Rate Monitoring Plan specified in Permit Attachment Q (Mine Ventilation Rate Monitoring Plan) and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.602 and §264.601(c)). The Permittees shall implement this plan within thirty (30) calendar days of approval by the Secretary until the certified closure of all Underground HWDUs.

IV.F.3.b.      Reporting requirements - as part of the annual report to the Secretary required under Permit Condition IV.F.2.b, the Permittees

shall describe the implementation and present the results of the data and analysis of the Mine Ventilation Rate Monitoring Plan.

IV.F.3.c. Notification requirements - the Permittees shall calculate the running annual average mine ventilation exhaust rate on a monthly basis. In addition, the Permittees shall evaluate compliance with the minimum active room ventilation rate specified in Permit Condition IV.E.3.b on a monthly basis. Whenever the evaluation of the mine ventilation monitoring program data identifies that the ventilation rates specified in Permit Condition IV.E.3.b have not been achieved, the Permittees shall notify the Secretary in writing within five (5) working days.

#### IV.G. INSPECTION SCHEDULES AND PROCEDURES

The Permittees shall inspect the Underground HWDUs at least weekly, as specified in Permit Attachment D (Inspection Schedule/Procedures, Tables D-1 and D-1a), and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15). The Permittees shall perform these inspections to detect malfunctions, signs of deterioration, operator errors, discharges, or any other factors which have caused or may cause a release of hazardous wastes or hazardous waste constituents to the environment or which may compromise the ability of any Underground HWDU to comply with the environmental performance standards in 20.4.1.500 NMAC (incorporating 40 CFR §264.601).

#### IV.H. RECORDKEEPING

##### IV.H.1. Underground HWDU Location Map

The Permittees shall maintain, in the operating record, a map containing the exact location and dimensions of each Underground HWDU with respect to permanently surveyed benchmarks.

##### IV.H.2. Disposal Waste Type and Location

The Permittees shall maintain, in the operating record, a record identifying the types and quantities of TRU mixed waste in each Underground HWDU and the disposal location of each container or container assembly (e.g., a 7-pack of standard 55-gallons drums) within each Underground HWDU, using the following fields from the WWIS data dictionary:

1. Panel Number
2. Room Number or Drift Number
3. Row Number (for CH TRU mixed waste) or Borehole Number (for RH TRU mixed waste)
4. Column Number (for CH TRU mixed waste)
5. Column Height (for CH TRU mixed waste)

6. Container Type Code
7. Container Identification Number
8. Manifest Document Number
9. Disposal Date

The Permittees shall also maintain, in the operating record, a map or diagram depicting the location and quantity of each waste. The map or diagram shall include a cross reference to specific manifest document numbers, if the waste was accompanied by a manifest, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73(b)(2)).

#### IV.H.3. Ventilation Rates

The Permittees shall maintain, in the operating record, a record identifying any non-conformance to the ventilation rates specified in Permit Condition IV.E.3.b.

#### IV.I. CLOSURE

##### IV.I.1. Panel Closure

Upon completion of disposal in an Underground HWDU, the Permittees shall close the Underground HWDU as specified in Permit Attachment I (Closure Plan) and Permit Attachment I1 (Technical Specifications, Panel Closure System, Waste Isolation Pilot Plant).

##### IV.I.2. Repository Closure

Upon completion of disposal in the repository and closure of all Underground HWDUs, the Permittees shall close the repository as specified in Permit Attachment I and Permit Attachment I2 (Shaft Sealing System Compliance Submittal Design Report).

##### IV.I.3 Repository Post-Closure

Upon completion of repository closure as specified in Permit Condition IV.I.2, the Permittees shall comply with all post-closure requirements as specified in Permit Module VI, Post-Closure Care.

#### IV.J. COMPLIANCE SCHEDULE

The Permittees shall provide a Mine Ventilation Rate Monitoring Plan to the Secretary within ninety (90) calendar days of issuance of this Permit.

##### IV.J.1. Objective

The Mine Ventilation Rate Monitoring Plan shall specify a monitoring program that will result in the collection of data of adequate quantity and quality to allow the Permittees to demonstrate compliance with the ventilation requirements of Permit Condition IV.E.3.b.

1 IV.J.2. Content of the Mine Ventilation Rate Monitoring Plan

2  
3 The Mine Ventilation Rate Monitoring Plan shall address the following at a minimum:  
4 objectives of the monitoring; design of the monitoring program (including monitoring  
5 schedule and monitoring equipment); monitoring procedures; equipment calibration and  
6 maintenance; data evaluation, reporting and recordkeeping; and quality assurance.  
7

8 IV.J.3. Incorporation of Permit Requirements

9  
10 The Permittees shall incorporate the implementation, reporting and notification  
11 requirements of Permit Condition IV.F.3 into the appropriate section(s) of the Mine  
12 Ventilation Rate Monitoring Plan.  
13

14 IV.J.4. Approval of the Plan

15  
16 After the Permittees submit the Mine Ventilation Rate Monitoring Plan, the Secretary may  
17 approve, disapprove, or modify and approve the Mine Ventilation Rate Monitoring Plan in  
18 writing.  
19

20 If the Secretary approves the Mine Ventilation Rate Monitoring Plan, the Secretary will  
21 modify the permit in accordance with Permit Condition I.B.1.  
22

23 In the event of disapproval (in whole or in part) of the Mine Ventilation Rate Monitoring  
24 Plan, the Secretary shall specify deficiencies in writing. The Permittees shall correct these  
25 deficiencies and submit a modified Mine Ventilation Rate Monitoring Plan within thirty  
26 (30) calendar days of such written notification to the Secretary for review.

PERMIT ATTACHMENTS

- Permit Attachment D (as modified from WIPP RCRA Part B Permit Application, "Procedures to Prevent Hazards" - Chapter F).
- Permit Attachment G (as modified from the WIPP RCRA Part B Permit Application, "Facility Description" - Chapter B).
- Permit Attachment I (as modified from WIPP RCRA Part B Permit Application, "Closure Plans, Post-Closure Plans, and Financial Requirements" - Chapter I).
- Permit Attachment I1 (as modified from WIPP RCRA Part B Permit Application, "Detailed Design Report for an Operational Phase Panel-Closure System" - Appendix I1).
- Permit Attachment I2 (as modified from WIPP RCRA Part B Permit Application, "Waste Isolation Pilot Plant Shaft Sealing system Compliance Submittal Design Report" - Appendix I2, as replaced by Sandia Report SAND 96-1326).
- Permit Attachment M1 (as modified from WIPP RCRA Part B Permit Application, "Facility and Process Information" - Chapter D).
- Permit Attachment M2 (as modified from WIPP RCRA Part B Permit Application, "Facility and Process Information" - Chapter D).
- Permit Attachment M3 (as modified from WIPP RCRA Part B Permit Application, "Underground Facilities Typical Disposal Panel" - Drawing Number 51-W-214-W).
- Permit Attachment N (as modified from WIPP RCRA Part B Permit Application, "Confirmatory Volatile Organic Compound Monitoring Plan" - Appendix D20).
- Permit Attachment Q ("Mine Ventilation Rate Monitoring Plan").